

## GENERAL MOTORS (TRUCKS & VANS)

**NOTE:** Before performing Electronically Erasable Programmable Read Only Memory (EEPROM) programming procedure, check for any applicable Technical Service Bulletins (TSBs) that may apply to vehicle application. BCM/PCM/VCM must be programmed with proper Regular Production Option (RPO) configurations. Follow instructions on Techline(R) terminal and scan tool to program BCM/PCM/VCM.

### ASTRO & SAFARI

**NOTE:** Read all procedures listed to determine why and when each procedure is to be performed before proceeding.

#### Crankshaft Position (CKP) Sensor Variation Learn Procedure

1. Procedure must be performed if any of following have been done:
  - EEPROM was reprogrammed.
  - If CKP sensor was removed or replaced.
  - VCM was replaced.
2. Install scan tool. Apply parking brake. Block rear wheels. Ensure hood is closed.
3. Place transmission in Park (A/T models) or Neutral (M/T models). Start and warm engine until engine coolant temperature is at least 150°F (65°C). Ensure all accessories are off.
4. Apply service brakes. With engine idling, use scan tool to select and enable CKP sensor variation learn procedure.
5. Gradually accelerate engine to 4000 RPM. Quickly release throttle to idle position once CKP sensor variation learn procedure fuel cut-off is obtained and engine starts to decelerate. Once CKP sensor variation values are learned, VCM will return engine control to operator and engine will respond to throttle position.

**CAUTION: Ensure throttle is quickly released to idle position once CKP sensor variation learn procedure fuel cut-off is obtained and engine starts to decelerate.**

6. If CKP sensor variation learn procedure was completed, turn ignition off for at least 15 seconds and remove scan tool. If CKP sensor variation learn procedure was not completed, DTC P1336 will set. Perform diagnostic test procedures for DTC P1336 and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

1. If VCM was replaced, the EEPROM in the VCM must be programmed. If EEPROM is not programmed, a DTC will be set.
2. Ensure battery is fully charged. Ensure cable is properly connected on Data Link Connector (DLC). Turn ignition switch to ON position. Perform EEPROM programming using Techline(R) equipment. Follow manufacturer's instructions and latest software applicable for vehicle model.
3. Once EEPROM is reprogrammed, CKP sensor variation learn procedure and password learn procedure for anti-theft system must be performed. See **CRANKSHAFT POSITION (CKP) SENSOR VARIATION LEARN PROCEDURE**. See **PASSWORD LEARN PROCEDURE FOR ANTI-THEFT SYSTEM**.

**NOTE:** **If EEPROM programming fails, ensure all harness connections on VCM are okay. Check Techline(R) for latest software. If EEPROM programming still fails, replace VCM.**

4. Once CKP sensor variation learn procedure and password learn procedure for anti-theft system are performed, perform Powertrain On-Board Diagnostic (OBD) system check. See **POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK** in appropriate **SELF-DIAGNOSTICS** article in **ENGINE PERFORMANCE**.

#### **Password Learn Procedure For Passlock(R) Anti-Theft System**

**NOTE:** **If BCM or VCM are replaced, modules must be programmed with vehicle configuration before performing Passlock(R) reprogramming.**

1. Password learn procedure must be performed if VCM, Passlock(R) module or sensor is replaced. A password is communicated between VCM and Passlock(R) module to provide engine operation. If VCM is replaced, VCM must learn password from Passlock(R) module.
2. Momentarily turn ignition switch to CRANK position, but do not start engine. Release switch to RUN position, but do not turn off. Wait 10 minutes and observe SECURITY indicator light.

**NOTE:** **Ensure battery is fully charged before proceeding. Ensure steps are followed in correct order or procedure may need to be repeated.**

3. If Passlock(R) sensor was replaced, SECURITY indicator will flash for 10 minutes. If Passlock(R) module was replaced, SECURITY indicator will flash for a few seconds, then remain on for 10 minutes. If VCM was replaced with a new programmed VCM and connected to vehicle for the first time, vehicle will start and this procedure is not necessary. If replacement VCM was connected to any other vehicle at any other time,

SECURITY indicator will flash for a few seconds, then remain on for 10 minutes.

4. After 10 minutes, SECURITY indicator light will turn off. Turn ignition switch to OFF position and wait 10 seconds.
5. Repeat programming procedure 2 more times. New security code is ready to be communicated. New password is learned on next ignition switch lock cylinder from OFF to CRANK to ON.

#### **Vehicle Driveability Computer Relearn Procedure**

Manufacturer does not provide a specific computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or Vehicle Control Module (VCM) was replaced, driving vehicle will enable VCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until VCM completes computer relearn procedure.

#### **BLAZER, BRAVADA, ENVOY, JIMMY, PICKUP & SONOMA**

**NOTE: Read all procedures listed to determine why and when each procedure is to be performed before proceeding.**

#### **BCM Programming**

This procedure requires Techline(R) terminal and equipment. Ensure battery is fully charged. Ensure battery and lighter connectors are secure. Ensure DLC is accessible. Turn ignition switch to ON position. Refer to Techline(R) terminal and equipment user's instructions.

If BCM fails to program, check all BCM connections, check Techline(R) terminal and equipment for latest software version. Retry programming. If BCM fails to program again, replace BCM. See appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT. Clear DTCs after programming.

#### **Crankshaft Position (CKP) Sensor Variation Learn Procedure (2.2L & 4.3L)**

1. Procedure must be performed if any of following have been done:
  - EEPROM was reprogrammed.
  - If CKP sensor was removed or replaced.
  - VCM was replaced.
2. Install scan tool. Apply parking brake. Block rear wheels. Ensure hood is closed.
3. Place transmission in Park (A/T models) or Neutral (M/T models). Start and warm engine until engine coolant temperature is at least 150°F (65°C). Ensure all accessories are off.
4. Apply service brakes. With engine idling, use scan tool to select and enable CKP sensor variation learn procedure.

5. Gradually accelerate engine to 4000 RPM. Quickly release throttle to idle position once CKP sensor variation learn procedure fuel cut-off is obtained and engine starts to decelerate. Once CKP sensor variation values are learned, VCM will return engine control to operator and engine will respond to throttle position.

**CAUTION: Ensure throttle is quickly released to idle position once CKP sensor variation learn procedure fuel cut-off is obtained and engine starts to decelerate.**

6. If CKP sensor variation learn procedure was completed, turn ignition off for at least 15 seconds. Remove scan tool. If CKP sensor variation learn procedure was not completed, DTC P1336 will set. Perform diagnostic test procedures for DTC P1336 and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

#### **Electronically Erasable Programmable Read Only Memory (EEPROM) Programming (2.2L)**

1. If PCM was replaced, the EPROM in PCM must be programmed. If EEPROM is not programmed, a DTC will set. Perform EEPROM programming using Techline(R) equipment manufacturer's instructions and latest software applicable for vehicle model.
2. Once EEPROM is reprogrammed, CKP sensor variation learn procedure must be performed. See **CRANKSHAFT POSITION (CKP) SENSOR VARIATION LEARN PROCEDURE (2.2L & 4.3L)**.

#### **Electronically Erasable Programmable Read Only Memory (EEPROM) Programming (4.3L)**

1. If VCM was replaced, the EEPROM in VCM must be programmed. If EEPROM is not programmed, a DTC will set.
2. Ensure battery is fully charged. Ensure cable is properly connected on Data Link Connector (DLC). Turn ignition switch to ON position. Perform EEPROM programming using the Techline(R) equipment manufacturer's instructions and latest software applicable for vehicle model.
3. Once EEPROM has been reprogrammed, CKP sensor variation learn procedure and password learn procedure must be performed. See **CRANKSHAFT POSITION (CKP) SENSOR VARIATION LEARN PROCEDURE (2.2L & 4.3L)**. See **PASSLOCK(R) ANTI-THEFT LEARN PROCEDURE**. Once CKP sensor variation learn procedure and password learn procedure are performed, perform Powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If EEPROM programming fails, ensure all harness connections on VCM are okay. Check Techline(R) for latest software. If EEPROM programming still fails, replace VCM.

**NOTE: This procedure allows relearning of BCM module or VCM/PCM learned data code after replacement of BCM module, Passlock(R) sensor or VCM/PCM. DTC B3031 will set when entering programming mode.**

1. Turn ignition switch to OFF position. Replace failed component.
2. Place transmission in Park (A/T) or Neutral (M/T). Turn ignition switch momentarily to START position (engine will not start), then leave in RUN position. SECURITY indicator will stay on for 10 minutes. After 10 minutes, when indicator light turns off, turn ignition switch to OFF position for 5 seconds.
3. Repeat step 2 two more times. Auto learn procedure will be completed during next start attempt. If VCM/PCM was replaced, reprogram VCM/PCM. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.
4. Check for DTCs. If Passlock(R) codes exist, go to appropriate ANTI-THEFT SYSTEMS article in ACCESSORIES & EQUIPMENT. If PCM codes exist, diagnose affected DTC(s). See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

#### **Vehicle Driveability Computer Relearn Procedure (2.2L)**

Manufacturer does not provide a specific computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or PCM was replaced, driving vehicle will enable PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until PCM completes computer relearn procedure.

#### **Vehicle Driveability Computer Relearn Procedure (4.3L)**

Manufacturer does not provide a specific computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or VCM was replaced, driving vehicle will enable VCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until VCM completes computer relearn procedure.

#### **CUTAWAY, EXPRESS, RV CUTAWAY & SAVANA**

**NOTE: Read all procedures listed to determine why and when each procedure is to be performed before proceeding.**

**NOTE: References to California models apply to California emission vehicles, which may be verified by underhood Emission Control label. California emissions may be available in other states.**

& 6.0L)

1. If VCM was replaced, EEPROM in VCM must be programmed. If EEPROM is not programmed, a DTC will be set.
2. Ensure battery is fully charged. Ensure cable is properly connected on Data Link Connector (DLC). Turn ignition switch to ON position. Perform EEPROM programming using Techline(R) equipment manufacturer's instructions and latest software applicable for vehicle model.
3. Once EEPROM is reprogrammed, CKP sensor variation learn procedure and password learn procedure for anti-theft system must be performed using proper procedure. See appropriate ANTI-THEFT SYSTEMS article in ACCESSORIES & EQUIPMENT.

**NOTE:** **If EEPROM programming fails, ensure all electrical connections on VCM are okay. Check Techline(R) for latest software. If EEPROM programming still fails, replace VCM.**

4. Once CKP sensor variation learn procedure and password learn procedure for anti-theft system are performed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

#### **Electronically Erasable Programmable Read Only Memory (EEPROM) Programming (7.4L)**

1. If VCM was replaced, EEPROM in VCM must be programmed. If EEPROM is not programmed, a DTC will be set.
2. Ensure battery is fully charged. Ensure cable is properly connected on Data Link Connector (DLC). Turn ignition switch to ON position. Perform EEPROM programming using Techline(R) equipment manufacturer's instructions and latest software applicable for vehicle model.
3. Once EEPROM is reprogrammed, use scan tool to reset Idle Air Control (IAC) valve. On Calif. models, go to next step. On except Calif. models, go to step 5.
4. Once EEPROM is reprogrammed, password learn procedure for anti-theft system must be performed. See **PASSWORD LEARN PROCEDURE FOR ANTI-THEFT SYSTEM (7.4L)**. Once password learn procedure for anti-theft system has been performed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

**NOTE:** **CKP sensor variation learn procedure should ONLY be performed on except Calif. models. DO NOT perform CKP sensor variation learn procedure on Calif. models. Verify vehicle application by using underhood emission control label. If EEPROM programming fails, ensure all electrical**

**connections on VCM are okay. Check Techline(R) for latest software. If EEPROM programming still fails, replace VCM.**

- Once EEPROM is reprogrammed, CKP sensor variation learn procedure and password learn procedure for anti-theft system must be performed using proper procedure. Once CKP sensor variation learn procedure and password learn procedure for anti-theft system are performed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

#### **Powertrain Control Module (PCM) Programming (6.5L Diesel)**

- If PCM was replaced, PCM must be programmed. If PCM is not programmed, a DTC will be set.
- Ensure battery is fully charged. Ensure cable at Data Link Connector (DLC) and power supply for scan tool are properly connected. Turn ignition switch to ON position. Perform EEPROM programming using Techline(R) equipment manufacturer's instructions and latest software applicable for the vehicle model.
- Perform password learn procedure for anti-theft system. See **PASSWORD LEARN PROCEDURE FOR ANTI-THEFT SYSTEM (6.5L DIESEL)**. Once PCM is programmed, if only the PCM was replaced, go to next step. If crankshaft position sensor, engine or PCM with fuel injection pump were replaced, perform TDC offset learn procedure. See **TDC OFFSET LEARN PROCEDURE (6.5L DIESEL)**.

**NOTE: If PCM programming fails, ensure all electrical connections on PCM are okay. Check Techline(R) for latest software. If EEPROM programming still fails, replace PCM.**

- Start and warm engine until engine coolant temperature is at least 170°F (77°C). This will allow TDC offset to be programmed into the PCM if necessary. PCM has the ability to determine amount of offset required to bring engine to TDC. PCM uses TDC to determine proper fuel injection pump timing. If TDC offset is not programmed, DTC P1214 will be set.

#### **TDC Offset Learn Procedure (6.5L Diesel)**

- Procedure must be performed if any of following have been done or exists:
  - If sent here from DTC P1214.
  - Engine has been replaced.
  - CKP sensor or engine front cover has been replaced.
  - PCM and fuel injection pump have been replaced.

**NOTE: DO NOT perform procedure unless sent here from DTC**

**P1214 or one of the components listed above have been replaced.**

2. PCM has the ability to determine amount of offset required to bring the engine to TDC when TDC offset is not present or has been cleared. This procedure must be performed to allow PCM to be updated with correct TDC offset for vehicle application.
3. Install scan tool. Start and warm engine until engine coolant temperature is at least 170°F (77°C). Using scan tool, clear DTCs from PCM. Turn ignition switch to ON position, engine off. Fully depress and hold throttle at full throttle for at least 45 seconds.
4. Turn ignition switch to OFF position for 30 seconds. Start engine. Verify scan tool indicates TDC offset has been cleared to zero. If TDC offset has been cleared to zero, go to next step. If TDC offset has not been cleared to zero, repeat step 3 until TDC offset has been cleared to zero.
5. With engine running, use scan tool to verify engine coolant temperature is greater than 170°F (77°C). It may be necessary to drive vehicle to obtain correct engine coolant temperature if engine coolant temperature is less than specified.
6. As soon as engine coolant temperature is greater than 170°F (77°C) and engine speed is less than 1500 RPM, the PCM automatically learns a new TDC offset. The new TDC offset will overwrite the previous TDC offset. Using scan tool, note new TDC offset. TDC offset should be -.25 to -.75.
7. Turn engine off. If TDC offset is not within specification, go to next step. If TDC offset is within specification, TDC offset learn procedure is complete.
8. Using Flange Nut Wrench (J41089), loosen fuel injection pump retaining nuts. Fuel injection pump must be rotated to change TDC offset. Rotating fuel injection pump .039" (1.00 mm) will change TDC offset about 2 degrees. Rotating fuel injection pump toward driver's side of vehicle will produce a positive (+) number and rotating fuel injection pump toward passenger's side of vehicle will produce a negative (-) number.
9. Using Fuel Injection Pump Wrench (J 29872-A), slightly rotate fuel injection pump. Tighten fuel injection pump retaining nuts.
10. Repeat step 3 through 9 until TDC offset is within specification. If proper TDC offset cannot be obtained, check the following:
  - Ensure engine coolant temperature is greater than 170°F (77°C).
  - Harness connectors at PCM are properly installed.
  - Harness connectors at injection timing stepper motor on side of fuel injection pump is correctly installed.
  - Ensure latest Techline(R) software was used.
  - Check for proper base installation of fuel injection pump. The electric engine shutoff solenoid on top of fuel injection pump should be about up and down.

- Fuel injection pump may be defective, although manufacturer states this is highly unlikely.

**Crankshaft Position (CKP) Sensor Variation Learn Procedure (4.3L, 5.0L, 5.7L & 7.4L Except Calif.)**

1. Procedure must be performed if any of following have been done:
  - EEPROM was reprogrammed.
  - If CKP sensor was removed or replaced.
  - VCM was replaced.
2. Install scan tool on Data Link Connector (DLC). Apply parking brake. Block rear wheels. Ensure hood is closed.
3. Place transmission in Park (A/T models) or Neutral (M/T models). Start and warm engine until engine coolant temperature is at least 150°F (65°C). Ensure all accessories are off.
4. Apply service brakes. With engine idling, use scan tool to select and enable CKP sensor variation learn procedure.
5. Gradually accelerate engine to 4000 RPM. Quickly release throttle to idle position once CKP sensor variation learn procedure fuel cut-off is obtained and engine starts to decelerate. Once CKP sensor variation values are learned, VCM will return engine control to operator and engine will respond to throttle position.

**CAUTION: Ensure throttle is quickly released to idle position once CKP sensor variation learn procedure fuel cut-off is obtained and engine starts to decelerate.**

6. If CKP sensor variation learn procedure was completed, turn ignition off for at least 15 seconds. Remove scan tool. If CKP sensor variation learn procedure was not completed, DTC P1336 will set. Perform test procedures for DTC P1336 and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

**Password Learn Procedure For Anti-Theft System (4.3L, 5.0L & 5.7L)**

1. Password learn procedure must be performed if VCM, Passlock(R) module or sensor is replaced. A password is communicated between VCM and Passlock(R) module to provide engine operation. If VCM is replaced, VCM must learn password from Passlock(R) module.
2. Start engine. After engine stalls, leave ignition switch turned to ON position for 10 minutes. The SECURITY indicator light will stay on for 10 minutes and then turn off. The SECURITY indicator light is located on right corner of instrument panel.

**NOTE: Ensure battery is fully charged before proceeding. Ensure**

**steps are followed in correct order or procedure may need to be repeated.**

3. After SECURITY indicator light turns off, turn ignition off for 30 seconds. Attempt to start engine. After engine stalls, leave ignition switch turned to ON position for 10 minutes. SECURITY indicator light will stay on for 10 minutes and then turn off. After SECURITY indicator light turns off, turn ignition off for 30 seconds.
4. Attempt to start engine. After engine stalls, leave ignition switch turned to ON position for 10 minutes. SECURITY indicator light will stay on for 10 minutes and then turn off.
5. Turn ignition switch to OFF position for 30 seconds. Turn ignition switch to ON position and wait 30 seconds. Attempt to start engine. If engine starts, password learn procedure is complete. If engine does not start, ensure procedure was properly followed. If procedure was properly followed, check for any DTCs. If any DTCs exist, perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

**Password Learn Procedure For Anti-Theft System (6.5L Diesel)**

1. Password learn procedure must be performed if PCM, Passlock(R) module or sensor is replaced. A password is communicated between PCM and Passlock(R) module to provide engine operation. If PCM is replaced, PCM must learn password from Passlock (R) module.
2. Attempt to start engine. Engine will start and then stall. After engine stalls, leave ignition switch turned to ON position for 10 minutes. After engine stalls, the SECURITY indicator light will stay on for 10 minutes and then turn off. SECURITY indicator light is located on right corner of instrument panel.

**NOTE: Ensure battery is fully charged before proceeding.  
Performing this procedure will cause DTC P1630 to be set. It will be necessary to use scan tool to check for DTC P1630 when performing this procedure. Ensure steps are followed in correct order or procedure may need to be repeated.**

3. After SECURITY indicator light goes off, turn ignition off for 30 seconds. Attempt to start engine. After engine stalls, leave ignition switch turned to ON position for 10 minutes. SECURITY indicator light will stay on for 10 minutes and then turn off. After SECURITY indicator light turns off, turn ignition off for 30 seconds.
4. Attempt to start. After engine stalls, leave ignition switch turned to ON position for 10 minutes. SECURITY indicator light will stay on for 10 minutes and then turn off or until DTC P1630 is set.
5. Turn ignition switch to OFF position for 30 seconds. Turn ignition switch to ON position and wait 30 seconds. Attempt to start engine. If engine starts, password learn

procedure is complete. Ensure DTC P1630 is cleared from PCM by turning ignition off for 30 seconds and then turning ignition switch turned to ON position again. If DTC P1630 is not cleared from PCM, perform test procedures for DTC P1630 and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

**NOTE: DTC P1630 will be set in PCM as result of this procedure.**

**DTC P1630 may be cleared from PCM by turning ignition off for 30 seconds and then turning ignition switch to ON position again.**

6. If engine does not start, ensure procedure was properly followed. If procedure was properly followed, check for any DTCs. If any DTCs exist, perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

#### **Password Learn Procedure For Anti-Theft System (7.4L)**

1. Password learn procedure must be performed if VCM, Passlock(R) module or sensor is replaced. A password is communicated between VCM and Passlock(R) module to provide engine operation. If VCM is replaced, VCM must learn password from Passlock(R) module.
2. Attempt to start engine. Engine will start and then stall. After engine stalls, leave ignition switch turned to ON position for 10 minutes. After engine stalls, the SECURITY indicator light will stay on for 10 minutes and then turn off. SECURITY indicator light is located on right corner of instrument panel.

**NOTE: Ensure battery is fully charged before proceeding.**

**Performing this procedure will cause DTC P1630 to set. It will be necessary to use scan tool to check for DTC P1630 when performing this procedure. Ensure steps are followed in correct order or procedure may need to be repeated.**

3. After SECURITY indicator light turns off, turn ignition off for 30 seconds. Attempt to start engine and then leave ignition switch turned to ON position. After engine stalls, leave ignition switch turned to ON position for 10 minutes. SECURITY indicator light will stay on for 10 minutes and then go off. After SECURITY indicator light turns off, turn ignition off for 30 seconds.
4. Attempt to start engine. After engine stalls, leave ignition switch turned to ON position for 10 minutes. SECURITY indicator light will stay on for 10 minutes and then turn off or until DTC 1630 is set.
5. Turn ignition switch to OFF position for 30 seconds. Turn ignition switch to ON position and wait 30 seconds. Attempt to start engine. If engine starts, password learn

procedure is complete. Ensure DTC 1630 is cleared by turning ignition off for 30 seconds and then turning ignition switch to ON position again. If DTC 1630 is not cleared, perform test procedures for DTC 1630 and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

**NOTE: DTC 1630 will be set as result of this procedure. DTC P1630 may be cleared from VCM by turning ignition off for 30 seconds and then turning ignition switch to ON position again.**

6. If engine does not start, ensure procedure was properly followed. If procedure was properly followed, check for any DTCs. If any DTCs exist, perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

#### **Vehicle Driveability Computer Relearn Procedure (4.3L, 5.0L, 5.7L & 7.4L)**

Manufacturer does not provide a specific computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or VCM was replaced, driving vehicle will enable VCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until VCM completes computer relearn procedure.

#### **Vehicle Driveability Computer Relearn Procedure (6.5L Diesel)**

Manufacturer does not provide a specific computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or PCM was replaced, driving vehicle will enable PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until PCM completes computer relearn procedure.

#### **ESCALADE, PICKUP, SIERRA, SILVERADO, TAHOE, YUKON & YUKON XL**

**NOTE: Read all procedures listed to determine why and when each procedure is to be performed before proceeding.**

**NOTE: References to California models apply to California emission vehicles, which may be verified by underhood emission control label. California emissions may be available in other states.**

#### **Crankshaft Position (CKP) Sensor Variation Learn Procedure (4.3L, 4.8L, 5.0L, 5.3L, 5.7L, 6.0L & 7.4L)**

1. Procedure must be performed if any of following have been done:

- EEPROM was reprogrammed.
- If CKP sensor was removed or replaced.

- VCM was replaced.

2. Install scan tool on Data Link Connector (DLC). Apply parking brake. Block rear wheels. Ensure hood is closed.
3. Place transmission in Park (A/T models) or Neutral (M/T models). Start and warm engine until engine coolant temperature is at least 150°F (65°C). Ensure all accessories are off.
4. Apply service brakes. With engine idling, use scan tool to select and enable CKP sensor variation learn procedure.
5. Gradually accelerate engine to 4000 RPM. Quickly release throttle to idle position once CKP sensor variation learn procedure fuel cut-off is obtained and engine starts to decelerate. Once CKP sensor variation values are learned, VCM will return engine control to operator and engine will respond to throttle position.

**CAUTION: Ensure throttle is quickly released to idle position once CKP sensor variation learn procedure fuel cut-off is obtained and engine starts to decelerate.**

6. If CKP sensor variation learn procedure was completed, turn ignition off for at least 15 seconds and remove scan tool. If CKP sensor variation learn procedure was not completed, DTC P1336 will set. Perform test procedures for DTC P1336 and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

#### **Electrically Erasable Programmable Read Only Memory (EEPROM) Programming (4.3L, 5.0L & 5.7L)**

1. If VCM was replaced, EEPROM in VCM must be programmed. If EEPROM is not programmed, a DTC will set.
2. Ensure battery is fully charged. Ensure cable is properly connected on Data Link Connector (DLC). Turn ignition switch to ON position. Perform EEPROM programming using the Techline(R) equipment manufacturer's instructions and latest software applicable for the vehicle model.
3. Once EEPROM is reprogrammed, CKP sensor variation learn procedure and password learn procedure for anti-theft system must be performed using proper procedure.

**NOTE: If EEPROM programming fails, ensure all harness connections on VCM are okay. Check Techline(R) for latest software. If EEPROM programming still fails, replace VCM.**

4. Once CKP sensor variation learn procedure and password learn procedure for anti-theft system are performed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

**Electronically Erasable Programmable Read Only Memory (EEPROM) Programming (7.4L)**

1. If VCM was replaced, EEPROM in VCM must be programmed. If EEPROM is not programmed, a DTC will set.
2. Ensure battery is fully charged. Ensure cable is properly connected on Data Link Connector (DLC). Turn ignition switch to ON position. Perform EEPROM programming using Techline(R) equipment manufacturer's instructions and latest software applicable for vehicle model.
3. CKP sensor variation learn procedure should ONLY be performed on except Calif. models. DO NOT perform CKP sensor variation learn procedure on Calif. models. Verify vehicle application by using underhood emission control label. On Calif. models, go to next step. On except Calif. models, if EEPROM programming fails, ensure all harness connections on VCM are okay. Check Techline(R) for latest software. If EEPROM programming still fails, replace VCM. Once EEPROM is reprogrammed, use scan tool to reset Idle Air Control (IAC) valve and then go to step 5.
4. Once EEPROM is reprogrammed, password learn procedure for anti-theft system must be performed using proper procedure. Once password learn procedure for anti-theft system has been performed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.
5. Once EEPROM is reprogrammed, CKP sensor variation learn procedure and password learn procedure for anti-theft system must be performed using proper procedure. Once CKP sensor variation learn procedure and password learn procedure for anti-theft system are performed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

**Powertrain Control Module (PCM) Programming (4.8L, 5.3L & 6.0L)**

1. Ensure battery is fully charged. Turn ignition switch to ON position. Program PCM using Techline(R) equipment manufacturer's instructions and latest software applicable for vehicle model.
2. Once PCM is reprogrammed, CKP sensor variation learn procedure, password learn procedure for anti-theft system, and PCM idle learn procedure must be performed.

**NOTE: If programming fails, ensure all harness connections on PCM are okay. Check Techline(R) for latest software. If programming still fails, replace PCM.**

**Powertrain Control Module (PCM) Programming (6.5L Diesel)**

1. If PCM was replaced, the PCM must be programmed. If PCM is not programmed, a DTC will be set.

2. Ensure battery is fully charged. Ensure cable at Data Link Connector (DLC) and power supply for scan tool are properly connected. Turn ignition switch to ON position. Perform EEPROM programming using Techline(R) equipment manufacturer's instructions and latest software applicable for vehicle model.
3. Perform password learn procedure for anti-theft system using proper procedure. Once PCM is programmed, if only the PCM was replaced, go to next step. If CKP sensor, engine or PCM with fuel injection pump were replaced, perform TDC offset learn procedure. See **TDC OFFSET LEARN PROCEDURE (6.5L DIESEL)**.

**NOTE:** **If PCM programming fails, ensure all harness connections on PCM are okay. Check Techline(R) for latest software. If EEPROM programming still fails, replace PCM.**

4. Start and warm engine until engine coolant temperature is at least 170°F (77°C). This will allow TDC offset to be programmed into PCM if necessary. PCM has the ability to determine amount of offset required to bring engine to TDC. PCM uses TDC offset to determine proper fuel injection pump timing. If TDC offset is not programmed, DTC P1214 will be set.

#### **Password Learn Procedure For Anti-Theft System (4.3L, 4.8L, 5.3L & 6.0L)**

1. Password relearn procedure must be performed if Passlock(R) sensor, BCM, PCM or VCM are replaced. Ensure battery is fully charged.
2. Using scan tool, clear DTCs. Turn ignition switch from OFF to CRANK position, allowing vehicle to try and start. Vehicle will start and then stall. Leave ignition switch turned to ON position while observing SECURITY indicator on instrument panel. When security indicator turns off (after about 10 minutes), turn ignition off. Wait 10 seconds. Repeat this step 3 more times. New password will be learned on next start attempt.

#### **Password Learn Procedure For Anti-Theft System (5.0L, 5.7L & 7.4L)**

1. Password learn procedure must be performed if VCM, Passlock(R) module or sensor is replaced. A password is communicated between VCM and Passlock(R) module to provide engine operation. If VCM is replaced, VCM must learn password from Passlock(R) module.
2. Attempt to start engine. Engine will start and then stall. After engine stalls, leave ignition switch turned to ON position for 10 minutes. After engine stalls, the SECURITY indicator light will stay on for 10 minutes and then turn off. The SECURITY indicator light is located on upper right corner of instrument panel.

**NOTE:** **Ensure battery is fully charged before proceeding. Performing this procedure will cause DTC P1630 to set. Use scan tool to check for DTC P1630 when performing this**

**procedure. Ensure steps are followed in correct order or procedure may need to be repeated.**

3. After SECURITY indicator light turns off, turn ignition off for 30 seconds. Start engine. After engine stalls, leave ignition switch turned to ON position for 10 minutes. SECURITY indicator light will stay on for 10 minutes and then go off. After SECURITY indicator light turns off, turn ignition off for 30 seconds.
4. Start engine. After engine stalls, leave ignition switch turned to ON position for 10 minutes. SECURITY indicator light will stay on for 10 minutes and then turn off or until DTC P1630 is set.
5. Turn ignition switch to OFF position for 30 seconds. Turn ignition switch to ON position and wait 30 seconds. Attempt to start engine. If engine starts, password learn procedure is complete. Ensure DTC P1630 is cleared from VCM by turning ignition off for 30 seconds and then turning ignition switch to ON position again. If DTC P1630 is not cleared from VCM, perform test procedures for DTC P1630 and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

**NOTE: DTC 1630 will be set in VCM as result of this procedure. DTC P1630 may be cleared from VCM by turning ignition off for 30 seconds and then turning ignition switch turned to ON position again.**

6. If engine does not start, ensure procedure was properly followed. If procedure was properly followed, check for any DTCs. If any DTCs exist, perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

#### **Password Learn Procedure For Anti-Theft System (6.5L Diesel)**

1. Password learn procedure must be performed if PCM, Passlock(R) module or sensor is replaced. A password is communicated between PCM and Passlock(R) module to provide engine operation. If PCM is replaced, PCM must learn password from Passlock (R) module.
2. Start engine. After engine stalls, leave ignition switch turned to ON position for 10 minutes, the SECURITY indicator light will stay on for 10 minutes and then turn off. SECURITY indicator light is located on upper right corner of instrument panel. After SECURITY indicator light turns off, turn ignition off for 30 seconds.

**NOTE: Ensure battery is fully charged before proceeding. Performing this procedure will cause DTC P1630 to set. Use scan tool to check for DTC P1630 when performing this procedure. Ensure steps are followed in correct order or**

**procedure may need to be repeated.**

3. Start engine. After engine stalls, leave ignition switch turned to ON position for 10 minutes. SECURITY indicator light will stay on for 10 minutes and then turn off. After SECURITY indicator light turns off, turn ignition off for 30 seconds.
4. Attempt to start engine. After engine stalls, leave ignition switch turned to ON position for 10 minutes. SECURITY indicator light will stay on for 10 minutes and then turn off or until DTC P1630 is set.
5. Turn ignition switch to OFF position for 30 seconds. Turn ignition switch to ON position and wait 30 seconds. Attempt to start engine. If engine starts, password learn procedure is complete. Ensure DTC P1630 is cleared by turning ignition off for 30 seconds and then turning ignition switch to ON position again. If DTC P1630 is not cleared, perform test procedures for DTC P1630 and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

**NOTE: DTC P1630 will be set as a result of this procedure. DTC P1630 may be cleared from PCM by turning ignition off for 30 seconds and then turning ignition switch to ON position again.**

6. If engine does not start, ensure procedure was properly followed. If procedure was properly followed, check for any DTCs. If any DTCs exist, perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

#### **TDC Offset Learn Procedure (6.5L Diesel)**

1. Procedure must be performed if any of following have been done or exists:
  - If sent here from DTC P1214.
  - Engine has been replaced.
  - CKP sensor or engine front cover has been replaced.
  - PCM and fuel injection pump have been replaced.
- NOTE: DO NOT perform procedure unless sent here from DTC P1214 or one of the components listed above has been replaced.**
2. The PCM has the ability to determine amount of offset required to bring engine to TDC when TDC offset is not present or has been cleared. This procedure must be performed to allow PCM to be updated with the correct TDC offset for vehicle application.
3. Install scan tool. Start and warm engine until engine coolant temperature is at least 170°F (77°C). Using scan tool, clear DTCs from PCM. Turn ignition switch to ON

position, engine off. Fully depress and hold throttle at full throttle for at least 45 seconds.

4. Turn ignition switch to OFF position for 30 seconds. Start engine. Verify scan tool indicates TDC offset has been cleared to zero. If TDC offset has been cleared to zero, go to next step. If TDC offset has not been cleared to zero, repeat step 3 until TDC offset has been cleared to zero.
5. With engine running, use scan tool to verify engine coolant temperature is greater than 170°F (77°C). It may be necessary to drive vehicle to obtain correct engine coolant temperature.
6. As soon as engine coolant temperature is greater than 170°F (77°C) and engine speed is less than 1500 RPM, the PCM automatically learns a new TDC offset. The new TDC offset will overwrite previous TDC offset. Using scan tool, note new TDC offset. TDC offset should be -.25 to -.75.
7. Turn engine off. If TDC offset is not within specification, go to next step. If TDC offset is within specification, TDC offset learn procedure is complete.
8. Using Flange Nut Wrench (J 41089), loosen fuel injection pump retaining nuts. Fuel injection pump must be rotated to change TDC offset. Rotating fuel injection pump .039" (1.00 mm) will change TDC offset about 2 degrees. Rotating fuel injection pump toward driver's side of vehicle will produce a positive (+) number and rotating fuel injection pump toward passenger's side of vehicle will produce a negative (-) number.
9. Using Fuel Injection Pump Wrench (J 29872), slightly rotate fuel injection pump. Tighten fuel injection pump retaining nuts.
10. Repeat steps 3 through 9 until TDC offset is within specification. If proper TDC offset cannot be obtained, check the following:
  - Ensure engine coolant temperature is greater than 170°F (77°C).
  - PCM harness connectors for proper installation.
  - Harness connectors at injection timing stepper motor on side of fuel injection pump for proper installation.
  - Ensure latest Techline(R) software was used.
  - Check for proper base installation of fuel injection pump. The electric engine shutoff solenoid on top of fuel injection pump should be approximately straight up and down.
  - Fuel injection pump may be defective, although manufacturer states this is highly unlikely.

#### Vehicle Driveability Computer Relearn Procedure (4.8L, 5.3L & 6.0L)

1. On manual transmission vehicles, go to next step. On automatic transmission vehicles, turn ignition off. Reconnect PCM battery connection. Turn A/C off. Set parking brake and block drive wheels. Start and operate engine until coolant reaches 176°F (80°C).

Place transmission in Drive. Operate engine at idle for 5 minutes. Place transmission in Park. Idle engine another 5 minutes. Turn engine off for 30 seconds. PCM relearn procedure is complete.

2. On manual transmission vehicles, turn ignition off. Reconnect PCM battery connection. Turn A/C off. Set parking brake and block drive wheels. Place transmission in Neutral. Start and operate engine until coolant reaches 176°F (80°C). Operate engine at idle for 5 minutes. Turn engine off for 30 seconds. PCM relearn procedure is complete.

**Vehicle Driveability Computer Relearn Procedure (4.3L, 5.0L, 5.7L & 7.4L)**

Manufacturer does not provide a specific computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or VCM was replaced, driving the vehicle will enable VCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until VCM completes the computer relearn procedure.

**Vehicle Driveability Computer Relearn Procedure (6.5L Diesel)**

Manufacturer does not provide a specific computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or PCM was replaced, driving the vehicle will enable PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until PCM completes the computer relearn procedure.

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**NOTE:     Read all procedures listed to determine why and when each procedure is to be performed before proceeding.**

**Crankshaft Position (CKP) Sensor Variation Learn Procedure**

1. Procedure must be performed if any of following have been done or exist:
  - EEPROM was reprogrammed.
  - If DTC P1336 exists.
  - If crankshaft, CKP sensor, engine, PCM or vibration damper have been replaced.
2. CKP sensor variation compensating values are stored in PCM after a learn procedure has been performed. If actual CKP sensor values are not within specification, DTC P0300 will be stored.
3. Using scan tool, check for stored DTCs. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If no DTCs exist, or if DTC P1336 exists, go to next step. If any DTCs exist except for P1336, perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Ensure all DTCs are learned from PCM, then go to next step.
4. Ensure ignition is off. Apply parking brakes. Block front wheels. Ensure hood is

closed. Start and warm engine until engine coolant temperature is at least 158°F (70°C). Turn ignition switch to OFF position.

**NOTE: Ensure engine coolant temperature is at least 158°F (70°C) before performing CKP sensor variation learn procedure.**

5. Using scan tool, select and enable CKP sensor variation learn procedure. Start engine. Apply service brakes. Ensure transaxle is in Park.
6. Accelerate engine until CKP sensor variation learn procedure fuel cut-off is obtained at 5150 RPM. Quickly release throttle to idle position once CKP sensor variation learn procedure fuel cut-off is obtained and engine starts to decelerate. Once CKP sensor variation values are learned, PCM will return engine control to operator and engine will respond to throttle position.

**CAUTION: Ensure throttle is quickly released to idle position once CKP sensor variation learn procedure fuel cut-off is obtained.**

7. If CKP sensor variation learn procedure was not terminated, go to next step. If CKP sensor variation learn procedure was terminated, this may be caused by PCM detecting a problem in CAM signal setting DTC P0341 or a problem in 3X crank signal setting DTC P1374, or a problem in the 3X or 24X crank signal setting DTC P0336. Using scan tool, check for stored DTCs. Perform test procedures for specified DTCs and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.
8. Check status of DTC P1336 on scan tool. If scan tool indicates DTC P1336 ran and passed, CKP sensor variation learn procedure fuel cut-off is complete. If scan tool indicates that DTC P1336 failed or was not run, check for any other DTCs. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If any other DTCs exist, perform test procedures for specified DTC and repair as necessary. If no other DTCs exist, repeat CKP sensor variation learn procedure.

#### **Electronically Erasable Programmable Read Only Memory (EEPROM) Programming**

1. If PCM was replaced, the EEPROM in PCM must be programmed. If EEPROM is not programmed, a DTC will set.
2. Ensure battery is fully charged. If battery is being charged, ensure battery charger is disconnected before performing EEPROM programming procedure.
3. Ensure cable is properly connected on Data Link Connector (DLC). Turn ignition switch to ON position. Perform EEPROM programming using Techline(R) equipment manufacturer's instructions and latest software applicable for vehicle model. New PCM must learn PASS-Key(R) password. See **PASS-KEY(R) III MODULE PROGRAMMING**.

4. Once EEPROM has been reprogrammed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Ensure engine is idling for one minute before checking for DTCs when performing powertrain OBD system check. Also, after EEPROM has been reprogrammed, the CKP sensor variation learn procedure must be performed. See **CRANKSHAFT POSITION (CKP) SENSOR VARIATION LEARN PROCEDURE**.

**NOTE: If EEPROM programming fails, ensure all harness connections on PCM are okay. Check Techline(R) for latest software. If EEPROM programming still fails, replace PCM.**

#### PASS-Key(R) III Module Programming

**NOTE: New modules are unprogrammed. New module automatically learns first key used to start engine. New module can only be programmed once.**

#### PASS-Key(R) III System Auto Learn Procedure

**NOTE: PASS-Key(R) III system auto learn procedure must be performed if all keys are lost, or powertrain Control Module (PCM), PASS-Key(R) III module, ignition lock cylinder, steering column assembly or ignition key are replaced. A password is communicated between PASS-Key(R) III module and PCM to provide engine operation. If PCM is replaced, the PCM must learn the password from the PASS-Key(R) III module.**

1. Insert a valid mechanical coded unlearned ignition key in ignition switch. Place ignition switch in RUN position. The SECURITY indicator light will flash once per second for 10 minutes for the length of the auto learn timer.
2. When auto learn timer expires and SECURITY indicator light goes off, place ignition switch in OFF position. Remove ignition key. Wait 10 seconds.
3. Repeat steps 1 and 2 two more times. Insert the newly learned ignition key in ignition switch.
4. Place ignition switch in RUN position. The SECURITY indicator light should remain off to indicate that ignition key was learned. This will be the only learned key. To program more keys, see **PASS-KEY(R) III SYSTEM QUICK LEARN PROCEDURE**. If security indicator does not remain off, repeat procedure.

#### PASS-Key(R) III System Quick Learn Procedure

**NOTE: PASS-Key(R) III system quick learn procedure is used to learn additional ignition keys. A learned key must be used to initiate procedure. Up to 10 ignition keys can be learned.**

1. Insert a valid ignition key in ignition switch. Turn ignition switch to ON position. After 2 second bulb test, turn ignition off and remove key.
2. Within 10 seconds, insert new valid mechanical code unlearned key and turn ignition switch to RUN position. Security light will illuminate until key is learned. This may happen so quickly light illumination is not observed. Turn ignition switch to OFF position. Remove ignition key 10 seconds after light goes out.
3. To learn additional keys, repeat step 2. To exit procedure, turn ignition off for more than 10 seconds.

#### **Vehicle Driveability Computer Relearn Procedure**

Manufacturer does not provide a specific computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or PCM was replaced, driving the vehicle will enable PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until the PCM completes the computer relearn procedure.

#### **TRACKER**

**NOTE: PCM does not have a reprogrammable EEPROM. No special procedures are required for programming the PCM.**

#### **Vehicle Driveability Computer Relearn Procedure**

Manufacturer does not provide a specific computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or PCM was replaced, driving the vehicle will enable PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until PCM completes the computer relearn procedure.